CLAIMS

1. (currently amended) A method for determining primary and restoration paths for a new service in a mesh network having a plurality of nodes interconnected by a plurality of links, the method comprising:

for each of a plurality of candidate path pairs for the new service, each candidate path pair comprising a candidate primary path and a candidate restoration path for the new service, generating a path cost associated with said each candidate path pair, wherein the path cost for a candidate path pair is a function of two or more link costs, wherein each link cost is a function of sharability of ~~one or more~~ a different corresponding link[[s]] within the corresponding candidate restoration path, wherein the sharability of the corresponding link corresponds to the ability of the corresponding link to reserve protection bandwidth that is shared between restoration paths of two or more primary paths; and

selecting the primary and restoration paths for the new service from the plurality of candidate path pairs based on the path cost of each candidate path pair.

2. (original) The invention of claim 1, wherein generating the path cost for each candidate path pair comprises:

generating a link cost associated with each link in the corresponding candidate restoration path; and

generating the path cost as a function of a sum of the link costs for all links in the candidate restoration path.

3. (currently amended) The invention of claim 2, wherein, for each link, generating the link cost comprises:

determining whether sharing is available on the link; and

if sharing is available, then generating the link cost as a function of a sharing degree for the link, wherein the sharing degree is the maximum number of additional unit-bandwidth primary services that can be added to the candidate primary path without increasing restoration bandwidth reserved on the link.

4. (original) The invention of claim 3, wherein, if sharing is not available, then:

determining whether utilization of the link is greater than a specified threshold;

if the link utilization is greater than the specified threshold, then generating the link cost as a function of an administrative weight for the link and available capacity on the link; and

if the link utilization is less than the specified threshold, then generating the link cost as a function of the administrative weight for the link.

5. (original) The invention of claim 3, wherein the link cost is also generated as a function of an administrative weight for the link.

6. (original) The invention of claim 3, wherein the link cost is also generated as a function of a form of a sharing degree.

7. (previously presented) The invention of claim 3, wherein the sharing degree is calculated using a binary representation of a node-link vector and a binary representation of a primary path node-link vector, wherein the calculation of the sharing degree comprises:

computing the bitwise AND of the binary representation of the node-link vector and the binary representation of the primary path node-link vector, and

computing the OR of all elements of the resulting vector to determine whether sharing is possible.

8. (original) The invention of claim 1, wherein the sharability of a link in a candidate restoration path is represented by a sharing degree for the link, wherein the sharing degree is a maximum number of additional unit-bandwidth primary services that can be added to the candidate primary path without increasing restoration bandwidth reserved on the link.

9. (original) The invention of claim 8, wherein the sharing degree SD for a link is given by:

SD = the maximum value m for which $\max\{ m \cdot V_{pnl} + V_{nla} \}$ = RB,

wherein:

V_{pnl} is a primary path node-link vector for the corresponding candidate primary path;

V_{nla} is an aggregate node-link vector for the link; and

RB is current reservation bandwidth on the link.

10. (original) The invention of claim 8, wherein the sharing degree SD for a link is given by:

SD = the maximum value m for which $\max\{ m \cdot V_{pn} + V_{na} \}$ = RB,

wherein:

V_{pn} is a primary path node vector for the corresponding candidate primary path;

V_{na} is a node-aggregate vector for the link; and

RB is current reservation bandwidth on the link.

11. (currently amended) A network manager for a mesh network having a plurality of nodes interconnected by a plurality of links, the network manager adapted to determine primary and restoration paths for a new service in a mesh network, wherein:

for each of a plurality of candidate path pairs for the new service, each candidate path pair comprising a candidate primary path and a candidate restoration path for the new service, the network manager is adapted to generate a path cost associated with said each candidate path pair, wherein the path cost for a candidate path pair is a function of two or more link costs, wherein each link cost is a function of sharability of ~~one or more~~ a different corresponding link[[s]] within the corresponding candidate restoration path, wherein the sharability of the corresponding link corresponds to the ability of the corresponding link to reserve protection bandwidth that is shared between restoration paths of two or more primary paths; and

the network manager is adapted to select the primary and restoration paths for the new service from the plurality of candidate path pairs based on the path cost of each candidate path pair.

12. (original) The invention of claim 11, wherein the network manager is distributed over the network.

13. (original) The invention of claim 11, wherein the network manager is located at a single node of the network.

14. (previously presented) The invention of claim 1, wherein the path cost is independent of the sharability of any link within the corresponding candidate primary path.

15. (previously presented) The invention of claim 2, wherein the candidate restoration path comprises at least two links.

16. (previously presented) The invention of claim 4, wherein:

if the link utilization is greater than the specified threshold, then generating the link cost in accordance with the formula $\omega^{NS} = \frac{AW \cdot MWC}{AC^f}$, wherein ω^{NS} is the link cost when sharing is not considered, AW is an administrative weight for the link, MWC is a maximum weight coefficient, AC is available capacity for the link, and f is an exponentiation factor; and

if the link utilization is less than the specified threshold, then generating the link cost in accordance with the formula $\omega^{NS} = AW$.

17. (previously presented) The invention of claim 7, wherein the binary representation of the node-link vector and the binary representation of the primary path node-link vector each have a plurality of entries corresponding to the nodes and links in the network and each entry of each vector identifies whether failure of the corresponding node or link will cause activation of all the bandwidth that was reserved for restoration paths on the link.

18. (new) A method for determining primary and restoration paths for a new service in a mesh network having a plurality of nodes interconnected by a plurality of links, the method comprising:

for each of a plurality of candidate path pairs for the new service, each candidate path pair comprising a candidate primary path and a candidate restoration path for the new service, generating a path cost associated with said each candidate path pair, wherein the path cost for a candidate path pair is a function of sharability of one or more links within the corresponding candidate restoration path, wherein generating the path cost for each candidate path pair comprises:

generating a link cost associated with each link in the corresponding candidate restoration path, wherein, for each link, generating the link cost comprises:

determining whether sharing is available on the link;

if sharing is available, then generating the link cost as a function of a sharing degree for the link; and

if sharing is not available, then:

determining whether utilization of the link is greater than a specified threshold;

if the link utilization is greater than the specified threshold, then generating the link cost as a function of an administrative weight for the link and available capacity on the link, in accordance with the formula $\omega^{NS} = \frac{AW \cdot MWC}{AC^f}$, wherein ω^{NS} is the link cost when sharing is not considered, AW is an administrative weight for the link, MWC is a maximum weight coefficient, AC is available capacity for the link, and f is an exponentiation factor; and

if the link utilization is less than the specified threshold, then generating the link cost as a function of the administrative weight for the link, in accordance with the formula $\omega^{NS} = AW$; and

generating the path cost as a function of a sum of the link costs for all links in the candidate restoration path; and

selecting the primary and restoration paths for the new service from the plurality of candidate path pairs based on the path cost of each candidate path pair.